

THE EPHEMEROPTERA OF NEW ZEALAND AND NEW CALEDONIA

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ABSTRACT

The status of our systematic knowledge of the Ephemeroptera of New Zealand and New Caledonia is discussed. In New Zealand the Leptophlebiidae are the largest group, while in New Caledonia the Leptophlebiidae are the only family except for one report of Baetidae. In both cases modern systematic studies are available for the Leptophlebiidae. All species and genera are endemic to New Zealand and New Caledonia, and all genera are closely related to those in Australia, southern South America, South Africa, Madagascar, the Seychelles, Sri Lanka, Southern India and Sulawesi. The remaining genera in other families occurring in New Zealand are listed.

OVERVIEW

New Zealand

The first mayflies recorded from New Zealand were *Palingenia humeralis* and *Baetis remota* (both now referred to *Coloburiscus humeralis*) and *Baetis scita* (now referred to *Neozephlebia*) based on descriptions by Walker (1853). Gradually, other species were added to this list so that by 1899, Eaton could count 11 described species and one undescribed species from New Zealand.

Since the introduction of freshwater trout to New Zealand in the 1860's (McDowell 1994), the mayflies and other aquatic insects of New Zealand have been studied by many fishermen and photographers, but unfortunately few systematic papers have ever been published on the mayflies.

For many years both amateurs and scientists alike had to rely on the works of Phillips (1930a,b; 1931) to identify New Zealand mayflies. Since Phillips' revisions of the New Zealand Ephemeroptera, Penniket published additional studies and these included Penniket (1961) on the Leptophlebiidae, Penniket (1962a,b) on *Oniscigaster* and *Siphlaenigma*, and Penniket (1966) on *Rallidens*. Towns and Peters (1978, 1979a,b) and Towns (1983) began

to revise the genera of New Zealand Leptophlebiidae, and these results were included in the 1996 monograph on the Leptophlebiidae of New Zealand. Thirty species in 12 genera are represented, all endemic to New Zealand. Closely related genera occur in New Caledonia, Australia, southern South America, South Africa, Madagascar, the Seychelles, Sri Lanka, Southern India and Sulawesi. The revision includes descriptions of all genera and species and illustrated keys to the imagos and nymphs of all taxa.

The imaginal and nymphal keys also include all other mayfly genera in New Zealand. These are: Siphlaenigmatidae (*Siphlaenigma*, 1 sp.), Coloburiscidae (*Coloburiscus*, 1 sp.), Nesameletidae (*Nesameletus*, 2 spp.), Rallidentidae (*Rallidens*, 1 sp.), Ameletopsidae (*Ameletopsis*, 1 sp.), Oniscigastridae (*Oniscigaster*, 3 spp.), and Ephemeridae (*Ichthybotus*, 1 sp.). All genera are endemic and with the exception of *Ichthybotus*, all are closely related to genera in Australia and southern South America. Currently, Mr. Terry Hitchings of the Canterbury Museum is reevaluating Penniket's original collection in the Canterbury Museum, especially Penniket's unpublished study on *Nesameletus*.

New Caledonia

Kimmins (1953) recorded the first mayfly from New Caledonia as "? *Atalophlebia* sp." based on two male imagos and one female subimago collected in Nouméa. In June, 1965, Dr. George F. Edmunds, Jr., University of Utah, received from Prof. Dr. F. Starmühlner, 1. Zoologischen Institutes der Universität Wien, a collection of mayfly nymphs from New Caledonia. All specimens were Leptophlebiidae and none could be assigned to known species and genera in the world.

This collection prompted me to request from the National Geographic Society, Washington, D.C., funds to collect and rear mayflies in New Caledonia. All mayfly specimens obtained on this trip were again Leptophlebiidae, except for two subimaginal specimens of Baetidae from Rivière Bleue upstream of a reservoir in southern New Caledonia. Results of this collecting trip are published in six systematic papers: Peters and Peters (1979-1980, 1981a,b) and Peters, Peters and Edmunds (1978, 1990, 1994); two remaining systematic parts and keys to the entire fauna are yet to be published. When completed, these papers will describe 46 species arranged in 19 genera. All taxa are endemic with sister group relations in New Zealand, except for one genus (*Kariona*) which appears most closely related to a genus in Madagascar.

Currently, Nathalie Mary is collecting mayflies and other aquatic insects in New Caledonia for a biotic index study sponsored by the Université Paul-Sabatier in Toulouse. Her extensive collection of nymphal mayflies does contain several new species and at least one new genus.

Although the present state of knowledge of mayflies of New Zealand and New Caledonia appears quite good, it is clear from studies by both amateurs and professionals in New Zealand and from those of Nathalie Mary in New Caledonia that there are still species to be discovered. All Leptophlebiidae in this region belong to the subfamily Atalophlebiinae, but a complete study of the phylogenetic relationships of southern hemisphere genera will require more knowledge of genera from other regions, particularly Australia and Madagascar.

REFERENCES

- Eaton, A. E. 1899. An annotated list of the Ephemeridae of New Zealand. Trans. ent. Soc. Lond. 1899: 285-293.
- Kimmins, D. E. 1953. XXII.—Miss L. E. Cheesman's expedition to New Caledonia, 1949—Orders Odonata, Ephemeroptera, Neuroptera and Trichoptera. Ann. Mag. Nat. Hist., Ser. 12, 6 (64): 241-257.
- McDowell, R. M. 1994. Gamekeepers for the Nation: the story of New Zealand's acclimatisation societies 1861-1990. Canterbury Univ. Press, Christchurch.
- Penniket, J. G. 1961. Notes on New Zealand Ephemeroptera. I. The affinities with Chile and Australia and remarks on *Atalophlebia* Eaton (Leptophlebiidae). N. Z. Ent. 2 (6): 1-11.

- Penniket, J. G. 1962a. Notes on New Zealand Ephemeroptera. II. A preliminary account of *Oniscigaster wakefieldi* McLachlan, recently rediscovered (Siphonuridae). Rec. Canterbury Mus. 7:375-388.
- Penniket, J. G. 1962b. Notes on New Zealand Ephemeroptera. III. A new family, genus and species. Rec. Canterbury Mus. 7:389-398.
- Penniket, J. G. 1966. Notes on New Zealand Ephemeroptera. IV. A new siphonurid subfamily: Rallidentinae. Rec. Canterbury Mus. 8: 163-175.
- Peters, W. L. and J. G. Peters. 1979-1980. The Leptophlebiidae of New Caledonia (Ephemeroptera). Part II – Systematics. Cah. ORSTOM, sér. Hydrobiol. 13: 61-82.
- Peters, W. L. and J. G. Peters. 1981a. The Leptophlebiidae: Atalophlebiinae of New Caledonia (Ephemeroptera). Part III – Systematics. Rev. Hydrobiol. Trop. 14: 233-243.
- Peters, W. L. and J. G. Peters. 1981b. The Leptophlebiidae: Atalophlebiinae of New Caledonia (Ephemeroptera). Part IV – Systematics. Rev. Hydrobiol. Trop. 14: 245-252.
- Peters, W. L., J. G. Peters and G. F. Edmunds, Jr. 1978. The Leptophlebiidae of New Caledonia (Ephemeroptera). Part I – Introduction and systematics. Cah. ORSTOM, sér. Hydrobiol. 12: 97-117.
- Peters, W. L., J. G. Peters and G. F. Edmunds, Jr. 1990. The Leptophlebiidae: Atalophlebiinae of New Caledonia (Ephemeroptera). Part V – Systematics. Rev. Hydrobiol. Trop. 23: 121-140.
- Peters, W. L., J. G. Peters and G. F. Edmunds, Jr. 1996. The Leptophlebiidae: Atalophlebiinae of New Caledonia (Ephemeroptera). Part VI – Systematics. Rev. Hydrobiol. Trop. (1994) 27: 97-105.
- Phillips, J. S. 1930a. A revision of New Zealand Ephemeroptera. Part 1. Trans. Proc. N. Z. Inst. 61: 271-334. Plates 50-60.
- Phillips, J. S. 1930b. A revision of New Zealand Ephemeroptera. Part 2. Trans. Proc. N. Z. Inst. 61: 335-390. Plates 61-67.
- Phillips, J. S. 1931. Studies of New Zealand mayfly nymphs. Trans. ent. Soc. Lond. 79: 399-422. Plates XVI-XXII.
- Towns, D. R. 1983. A revision of the genus *Zephlebia* (Ephemeroptera: Leptophlebiidae). N. Z. J. Zool. 6: 409-419.
- Towns, D. R. and W. L. Peters. 1978. A revision of genus *Atalophlebioides* (Ephemeroptera: Leptophlebiidae). N. Z. J. Zool. 5: 607-614.
- Towns, D. R. and W. L. Peters. 1979a. Three new genera of Leptophlebiidae (Ephemeroptera) from New Zealand. N. Z. J. Zool. 6: 213-235.
- Towns, D. R. and W. L. Peters. 1979b. New genera and species of Leptophlebiidae (Ephemeroptera) from New Zealand. N. Z. J. Zool. 6: 439-452.
- Towns, D. R. and W. L. Peters. 1996. Leptophlebiidae (Insecta: Ephemeroptera). Fauna of New Zealand 36. Manaaki Whenua Press.
- Walker, F. 1853. Ephemerae. pp. 533-585, IN: List of the specimens of neuropterous insects in the collection of the British Museum, 3.